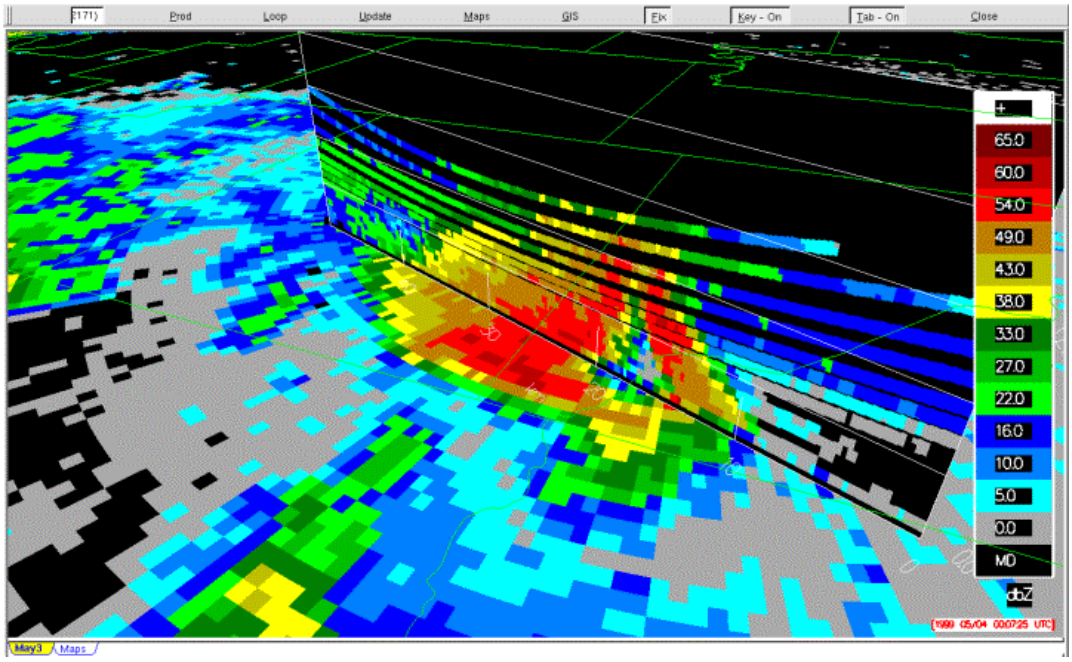
NATIONAL SEVERE STORMS LABORATORY

WICHITA KANSAS NWSFO

WARNING DECISION SUPPORT SYSTEM – INTEGRATED INFORMATION (WDSSII) PROOF-OF-CONCEPT TEST

APPENDIX A - SURVEYS



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WDSSII POST SHIFT QUESTIONNAIRE

Date: _____ Forecaster: _____ NSSL OP: _____

1. What feature(s) of the WDSSII display did you find most useful today in making warning decisions (e.g., 3D panning/zooming/flying, tables, multi-source product control, etc.)?

2. What feature(s) of the WDSSII display did you find least useful today in making warning decisions?

3. What algorithm(s) in the WDSSII did you find most useful today in making warning decisions (e.g., MR-SCIT, MR-HDA, gridded VIL, gridded hail, LLSD, etc.)?

4. What algorithm(s) in the WDSSII did you find least useful today in making warning decisions?

5. What is the one thing about the WDSSII that you like best?

6. What is the one thing about the WDSSII that you like least?

7. Did the WDSSII product(s) provide the information you needed in an effective manner?

8. Did the WDSSII make your warning decision making process easier or more difficult today?

*9. Please provide any additional comments regarding WDSSII that will help NSSL develop a better product for future operational warning systems:

WDSSII Proof-of-Concept Test Follow-up Survey

All questions that have a ____ in front of them use a rating scale of 0-5 where (unless otherwise noted). ½ points **are** allowed.

5 is the "best" or strongest agreement and 0 is the "worst" or least agreement

5	4	3	2	1	0
best				worst	

"N/A" should be used when you cannot assign a rating ("not applicable")

Room is provided for comments on some questions.

Multiple-Radar Storm Cell Identification and Tracking (MR-SCIT) Algorithm:

Overall Impressions:

____ Rate the overall skill of the Multiple-Radar SCIT Algorithm.

____ Rate the skill of the Multiple-Radar SCIT Algorithm at detecting storm cells (e.g., good or bad location, correct cells, missed cells, false cells).

____ Rate the skill of the Multiple-Radar SCIT Algorithm at diagnosing storm cells (e.g., maximum dBZ, VIL, etc.).

____ Rate the skill of the Multiple-Radar SCIT Algorithm at tracking and forecasting storm cells.

____ Rate the usefulness of the Multiple-Radar SCIT Algorithm as a warning guidance tool? Do you feel your warnings were improved? **Comments:** _____

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____ Rate the concept of a Multiple-Radar SCIT Algorithm? How do you feel NSSL could improve the Multiple-Radar SCIT Algorithm (please explain below)? **Comments:**

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Detection Skill:

____ Do you feel that the Multiple-Radar SCIT Algorithm was too conservative (too few cells - score of 0) or was too liberal (too many cells - score of 5) in identifying storm cells?

- Did you notice any detection bias as a function of range from the radar? Please answer below and explain. **Comments:** _____

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____ Rate the skill of the Multiple-Radar SCIT Algorithm to detect isolated pulse cells.

____ Rate the skill of the Multiple-Radar SCIT Algorithm to detect supercells.

____ Rate the skill of the Multiple-Radar SCIT Algorithm to detect cells within clusters and lines.

Rapid-Update Capability:

____ Rate the importance of the use of the "virtual volume scans" (always using the latest information from each radar's elevation scans) with the Multiple-Radar SCIT? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of 60-second rapid-update capability of the Multiple-Radar SCIT? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of 60-second resolution of trends?

Multiple-Radar Integration:

____ Rate the Multiple-Radar SCIT as compared to the WSR-88D single-radar SCIT?

____ Rate the importance of the ability to integrate data from multiple radars with the Multiple-Radar SCIT?

____ Does having only one set of storm cells identified by the Multiple-Radar SCIT versus choosing several detections per storm cell from individual radars (e.g., the old "CWA Table") make the warning process easier? Please answer 0 for not easier to 5 for much easier.

____ Rate the Multiple-Radar SCIT ability to detect and diagnose storm cells within poorly-sampled regions of single radars (cones-of-silence or at long ranges)?

Diagnostic Attributes:

____ Rate the Multiple-Radar SCIT cell-based VIL product function as compared to the single-radar 2km grid-based VIL (from AWIPS)?

____ Rate the Multiple-Radar SCIT cell-based Maximum dBZ product function as compared to the single-radar 2km grid-based Composite Reflectivity (from AWIPS)?

____ Rate the Multiple-Radar SCIT cell-based VIL product function as compared to the single-radar high-resolution polar grid-based VIL (from WDSSII)?

____ Rate the Multiple-Radar SCIT cell-based Maximum dBZ product function as compared to the single-radar high-resolution polar grid-based Composite Reflectivity (from WDSSII)?

____ Rate the Multiple-Radar SCIT cell-based VIL product function as compared to the multiple-radar high-resolution 1km grid-based VIL (from WDSSII)?

____ Rate the Multiple-Radar SCIT cell-based Maximum dBZ product function as compared to the multiple-radar high-resolution 1km grid-based Composite Reflectivity (from WDSSII)?

Cell Icons and Cell Table:

____ Rate the usefulness of the Multiple-Radar SCIT icon overlay? Consider the overlay color, the size, the design, the past positions and forecast tracks, and the presentation of the "forecast" (5 minute cross-hairs). How might you improve these features (please explain below)? **Comments:** _____

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____ Rate the usefulness of the Multiple-Radar SCIT output in the Cell Table? Are there other diagnostic attributes that could be calculated using a storm cell algorithm that you feel should be included in the table (please list below)? **Comments:** _____

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____ Rate the organization of the Cell Table.

____ Rate the Cell Table ID zoom function.

____ Rate the Cell Table sorting functions.

____ Rate the Cell Table trend launching function. Do you prefer to launch trends from the table, or by clicking the call icon?

____ What information would you like to see when clicking the cell icon? **Please list**:

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Additional Comments about the Multiple-Radar SCIT: _____

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Multiple-Radar Hail Diagnosis Algorithm (MR-HDA):

Overall Impressions:

____ Rate the overall skill of the Multiple-Radar HDA.

____ Rate the skill of the Multiple-Radar HDA at diagnosing the hail properties of storm cells (e.g., POSH, Maximum Hail Size, etc.).

____ Rate the skill of the Multiple-Radar HDA at predicting (0-45 minutes) hail events.

____ Rate the usefulness of the Multiple-Radar HDA as a warning guidance tool? Do you feel your warnings were improved? **Comments:** _____

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____ Rate the concept of a Multiple-Radar HDA? How do you feel NSSL could improve the Multiple-Radar HDA (please explain below)? **Comments:** _____

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Rapid-Update Capability:

____ Rate the importance of the use of the "virtual volume scans" (always using the latest information from each radar's elevation scans) with the Multiple-Radar HDA? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of the 60-second rapid-update capability of the Multiple-Radar HDA? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of the 60-second resolution of hail trends?

Multiple-Radar Integration:

____ Rate the Multiple-Radar HDA as compared to the WSR-88D single-radar HDA?

____ Rate the importance of the ability to integrate data from multiple radars with the Multiple-Radar HDA?

____ Does having only one set of cell-based hail numbers identified by the Multiple-Radar HDA per storm versus choosing several sets of hail numbers from individual-radar storm cell detections of the same cell (e.g., the old "CWA Table") make the warning process easier? Please answer 0 for not easier to 5 for much easier.

____ Rate the Multiple-Radar HDA ability to diagnose hail information within poorly-sampled regions of single radars (cones-of-silence or at long ranges)?

Diagnostic Attributes:

- Did you notice any detection bias as a function of range from the radar? Please answer below and explain. **Comments:** _____

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____ Rate the usefulness of the Multiple-Radar HDA probability of severe hail (POSH) product?

____ Rate the improvement of the Multiple-Radar HDA probability of severe hail (POSH) product over the single-radar HDA POSH product available on AWIPS?

____ Rate on a scale of 0 to 5 if you felt that the Multiple-Radar HDA POSH under-warned (score 0) or over-warned (score 5).

____ Rate the usefulness of the Multiple-Radar HDA maximum hail size estimate?

____ Rate the improvement of the Multiple-Radar HDA Maximum hail size estimate product over the single-radar HDA maximum hail size estimate product available on AWIPS?

____ Rate on a scale of 0 to 5 if you felt that the Multiple-Radar HDA maximum hail size estimate under-warned (score 0) or over-warned (score 5).

____ If you favored one product over the other, rate how you favored each on a scale of 0 to 5 (score 0 for POSH, score 5 for maximum hail size estimate).

____ Rate the Multiple-Radar HDA cell-based POSH and maximum hail size attributes function as compared to using the single-radar 2km grid-based VIL (from AWIPS) for hail diagnosis? Did this do better than a "VIL-of-the-Day" strategy? Please explain why. **Comments:** _____

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____ Rate the Multiple-Radar HDA cell-based POSH and maximum hail size attributes function as compared to the single-radar high-resolution polar grid-based POSH and hail size products (from WDSSII)?

____ Rate the Multiple-Radar HDA cell-based POSH and maximum hail size attributes function as compared to the multiple-radar high-resolution 1km grid-based POSH and hail size products (from WDSSII)?

Cell Icons and Cell Table (for MR-HDA Information):

____ Rate the usefulness of the color-coded storm-cell icons at providing information on the probability of severe hail for storm cells. Should we color code the cell icons based on other parameters, and if so, which ones (explain below)? **Comments:** _____

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____ Rate the usefulness of the Multiple-Radar HDA output in the Cell Table? Are there other diagnostic attributes that could be calculated for hail diagnosis that you feel should be included in the table? **Please list:** _____

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Additional Comments about the Multiple-Radar HDA: _____

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High-Resolution Gridded Storm Diagnosis Products:

Overall Impressions:

____ Rate the overall skill of the high-resolution polar gridded storm diagnosis products [ReflectivityMaximum, VIL, Echo Tops (H_18, H_30, H_45)].

____ Rate the skill of the high-resolution polar gridded ReflectivityMaximum product at diagnosing storm severity.

____ Rate the skill of the high-resolution polar gridded VIL product at diagnosing storm severity.

____ Do high-resolution polar gridded storm diagnosis products offer better information than cell-based diagnosis information? **YES NO (Circle one)**

____ Rate the high-resolution polar gridded ReflectivityMaximum function as compared to the single-radar 2km grid-based ReflectivityMaximum (from AWIPS)?

____ Rate the high-resolution polar gridded VIL function as compared to the single-radar 2km grid-based VIL (from AWIPS)?

____ Rate the high-resolution polar gridded 18 dB*Z* Echo Tops (H_18) function as compared to the single-radar 2km grid-based Echo Tops product (from AWIPS)?

____ Rate the high-resolution polar gridded 30 dB*Z* Echo Tops (H_30) function as compared to the single-radar SCIT cell-based storm tops product?

____ Rate the high-resolution polar gridded 30 dB*Z* Echo Tops (H_30) function as compared to the Multiple-Radar SCIT cell-based storm tops product?

____ Rate the usefulness of the 45 dB*Z* Echo Tops (H_45). Would you prefer to see other Echo Top products? **Please list:** _____

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- Are there other storm diagnostic attributes that could be calculated and gridded? **Please list:** _____

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____ Rate the usefulness of the high-resolution gridded storm diagnosis products as warning guidance tools? Do you feel your warnings were improved? **YES NO (Circle one)**

____ Rate the concept of high-resolution gridded storm diagnosis products? How do you feel NSSL could improve these products or the usage thereof? **Comments:** _____

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Rapid-Update Capability:

____ Rate the importance of the use of the "virtual volume scans" (always using the latest information from each radar's elevation scans) with the high-resolution gridded storm diagnosis? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of the 60-second rapid-update capability of the high-resolution gridded storm diagnosis? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

Multiple-Radar Integration:

____ WDSSII offers multiple-radar versions of the high-resolution gridded storm and diagnosis products. Rate how these compared to the single-radar versions. How might you suggest we improve either version? **Comments:** _____

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____ Rate the importance of the ability to integrate data from multiple radars with the high-resolution gridded storm diagnosis products?

____ Rate the Multiple-Radar high-resolution gridded storm diagnosis ability to diagnose storm signatures within poorly sampled regions of single radars (cones-of-silence or at long ranges)?

____ The product MergedReflectivityQCompositeComposite is a "quality-controlled" multi-radar mosaic of maximum reflectivity (aka composite reflectivity), and tries to remove non-precipitation echo (e.g., AP, clutter, chaff, and clear-air return) from the mosaic. Rate this product as compared to the "raw" multi-radar mosaic of maximum reflectivity.

Diagnostic Attributes:

- Did you notice any detection bias as a function of range from the radar? Please answer below and explain. **Comments:** _____

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Display formats:

____ Rate the usefulness of the color-tables provided for the high-resolution gridded storm diagnosis products. How would you improve these? **Comments:** _____

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Additional Comments about the Gridded Storm Diagnosis Products: _____

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High-Resolution Gridded Hail Diagnosis Products:

Overall Impressions:

____ Rate the overall skill of the high-resolution polar gridded hail diagnosis products (POH, POSH, MESH, MESH_Tracking, HailDamagePotential).

____ Rate the skill of the high-resolution polar gridded POH product in severe weather warning operations.

____ Rate the skill of the high-resolution polar gridded POSH product at diagnosing storm severity.

____ Rate the skill of the high-resolution polar gridded MESH product at diagnosing storm severity.

____ Rate the skill of the gridded Hail Swath products (MESH_Tracking and HailDamagePotential) at tracking hail information.

____ Rate the usefulness of the gridded Hail Swath products (MESH_Tracking and HailDamagePotential) at tracking hail information.

- Do gridded Hail Swath products offer better information than cell-based hail diagnosis information? **YES NO (Circle one)** How have these hail swaths helped you in operations (both real-time and for verification)? What is more useful, 1 hour tracks, or some other time period?

____ Rate the usefulness of the high-resolution polar gridded hail diagnosis products as warning guidance tools? Do you feel your warnings were improved?

____ Rate the concept of high-resolution polar gridded hail diagnosis products (static images and tracks)? How do you feel NSSL could improve products or the usage thereof (please explain below)? **Comments:** _____

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Rapid-Update Capability:

____ Rate the importance of was the use of the "virtual volume scans" (always using the latest information from each radar's elevation scans) with the high-resolution gridded hail diagnosis? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of the 60-second rapid-update capability of the high-resolution gridded hail diagnosis? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

Multiple-Radar Integration:

____ WDSSII offers multiple-radar versions of the high-resolution gridded hail diagnosis products. Rate how these compared to the single-radar versions. How might you suggest we improve either version? **Comments:** _____

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____ Rate the importance of the ability to integrate data from multiple radars with the high-resolution gridded hail diagnosis products?

____ Rate the Multiple-Radar high-resolution gridded hail diagnosis ability to diagnose storm and hail signatures within poorly sampled regions of single radars (cones-of-silence or at long ranges)?

Diagnostic Attributes:

- Did you notice any detection bias as a function of range from the radar? Please answer below and explain. **Comments:** _____

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____ There are two Hail Swath products, the MESH_Tracking and the HailDamagePotential. If you favored one product over the other, rate how you favored each on a scale of 0 to 5 (score 0 for MESH_Tracking, score 5 for HailDamagePotential).

Display formats:

____ Rate the usefulness of the color-tables provided for the high-resolution gridded hail diagnosis products. How would you improve these?

Additional Comments about the Gridded Hail Diagnosis Products: _____

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Linear-Least Squares Derivatives (LLSD) Gridded Velocity Shear Products:

Overall Impressions:

____ Rate the overall skill of the gridded LLSD Velocity Shear products.

____ Rate the skill of the LLSD Azimuthal Shear product at detecting rotation signatures (e.g., good/bad locations; hits, misses, false alarms).

____ Rate the skill of the LLSD Azimuthal Shear product at diagnosing the strength of rotation.

____ Rate the skill of the LLSD Azimuthal Shear Rotation Tracks products (2hr and 6hr) at tracking rotation signatures.

____ Rate the usefulness of the LLSD Azimuthal Shear Rotation Tracks products (2hr and 6hr) at tracking mesocyclones.

- Does a gridded rotation track offer better information than Mesocyclone Detection Algorithm tracks? **YES NO (Circle one)** How have these rotation tracks helped you in operations (both real-time and for verification)? What is more useful, 2 hour tracks, 6 hours tracks, or some other time period? **Comments:** _____

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____ Rate the skill of the LLSD Divergence product at detecting divergence/convergence signatures like gust fronts and downbursts (e.g., good/bad locations; hits, misses, false alarms).

____ Rate the skill of the LLSD Divergence product at diagnosing the strength of divergence/convergence.

____ Both the Azimuthal Shear and Divergence products were available as volume products. Rate the usefulness of the volume products. How did you use these in warning operations (e.g., cross-sections of rotation to examine vertical depth of mesocyclones)? **Comments:** _____

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____ Rate the usefulness of the LLSD Gridded Velocity Shear products as warning guidance tools? Do you feel your warnings were improved? **YES NO (Circle one)**

____ Rate the concept of LLSD Gridded Velocity Shear products (static images and tracks)? How do you feel NSSL could improve the LLSD products or the usage thereof (please explain below)? **Comments:** _____

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Rapid-Update Capability:

____ Rate the importance of the use of the "virtual volume scans" (always using the latest information from each radar's elevation scans) with the LLSD? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

____ Rate the importance of the 60-second rapid-update capability of the LLSD? Do you feel this added a few minutes to warning lead time? **YES NO (Circle one)**

Multiple-Radar Integration:

____ WDSSII offers multiple-radar versions of the LLSD products. Rate how these compared to the single-radar versions. How might you suggest we improve either version? **Comments:** _____

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____ Rate the importance of the ability to integrate data from multiple radars with the LLSD products?

____ Rate the Multiple-Radar LLSD ability to diagnose rotation, divergence, and convergence signatures within poorly sampled regions of single radars (cones-of-silence or at long ranges)?

Diagnostic Attributes:

- Did you notice any detection bias as a function of range from the radar? Please answer below and explain. **Comments:** _____

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Display formats:

____ Rate the usefulness of the color-tables provided for the LLSD products. How would you improve these?

____ The LLSD Rotation Tracks product only accumulates the maximum rotation within a grid point over a specified period. This represents cyclonic shear. Rate the usefulness of another product that accumulates the minimum rotations, or anticyclonic shear.

Additional Comments about the LLSD Products: _____

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Display (w2):

Please rate each of the following display functions:

____ Starting WDSSII display from scratch

____ Exiting the WDSSII display

- Product Selection Window:
  - ____ Source selection
  - ____ Selection of latest product
  - ____ Organization of sources and products
  - ____ Organization by product, elevation scan, time
  - ____ Time-centric (versus radar-centric as in legacy WDSS)

Comments: _____

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- Display Window functions:

  ____ Name

  ____ Prod

  ____ New Window (multiple-window feature)

  ____ Loop

  ____ Update

  ____ Maps

  ____ GIS

  ____ Fix

  ____ Key-On

  ____ Tab-On

  ____ Close

  Comments: _____

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- Mouse controls with Fix turned OFF

  ____ Panning/Roaming

  ____ Zoom

  - Is continuous panning and zooming desired over discrete versions on WDSS and AWIPS? **YES NO (Circle one)**

  Comments: _____

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- Mouse controls with Fix turned ON

  ____ Flying about data in 3D

  Comments: _____

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- Gridded Image Product Controls

  ____ Layering and management via tab control

  ____ Product controls (hide/nohide, only/revert, delete, advanced)

  ____ Data Readout function

  ____ Navigation (backward, now, forward, sync)

  ____ Storm motion vector selection

  Comments: _____

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- Graphical Algorithm Products

  ____ Product Controls (hide/nohide, only/revert, delete, never hide, advanced)

  ____ Navigation (backward, now, forward, sync)

  ____ Algorithm Icons

  ____ Past Tracks

  ____ Forecast Tracks

  ____ Query functions for icon filtering

  Comments: _____

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- Table Management
  - ____ Table colors
  - ____ Table column sorting
  - ____ Table ID zoom
  - ____ Table trends

Comments: _____

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- "Virtual Volume" Gridded Image Product Control
  - ____ Rate the virtual volume concept
  - ____ Product controls (hide/nohide, only/revert, delete, advanced)
  - ____ Data Readout function
  - ____ Navigation (up/down through virtual volume, base, backward, forward, sync)

  X-Section controls
  - ____ X-Plane
  - ____ 3D Box

  Comments: _____

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____ Map controls (e.g., adding city names, etc.)

____ Color Tables

____ Coordinate system choice versus legacy WDSS and AWIPS (earth-centric versus radar-centric)

____ Resolution of radar base data (8-bit for all elevations and all radars)

____ Resizable display windows

____ Rate the ease of layering different products from different sources on same display.

____ Overall Response Time

____ Overall Ease Of Use

____ Rate your feelings toward viewing data in native and 3D coordinate systems, and the ability to roam, pan, zoom, and fly in 3D around data. **Please also comment:**

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- **Add comments on how 3D data analysis should be integrated into NWS operations:**

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Add any Additional Display Comments Here: _____

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Overall WDSSII Test:

- Did you understand the objectives of the Proof-of-Concept test prior to its beginning? **YES NO (Circle one)**
- Do you understand the objectives of the Proof-of-Concept test now that it has been completed? **YES NO (Circle one)**
- Do you think NSSL accomplished their objectives? **YES NO (Circle one)** If not, why? **Comments:** _____

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  _____
- Do you think the Operations Plan was written in an easily understood format? **YES NO (Circle one)**
- Do you think the Display User Guide was written in an easily understood format? **YES NO (Circle one)**
- Was the training representative of how to use the system during real-time operations? **YES NO (Circle one)**
- List the most significant outcome of the Proof-of-Concept test **Comments:** _____

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- List the disappointments concerning the Proof-of-Concept test **Comments:** _____

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- If NSSL were to do another Proof-of-Concept test, what do you think they should do differently? **Comments:** _____

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- Was the Proof-of-Concept test a productive experience? **YES NO (Circle one)**
- How did you find the interaction with the NSSL meteorologists during operations? **Comments:** _____

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- Did the NSSL meteorologists aid or hinder in certain aspects of the warning operations? **Comments:** _____

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- Did the WDSSII, overall, help, hinder, or add very little to warning operations? **Comments:** _____

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____ Rate the overall features of the WDSSII as compared to the legacy WDSS?

____ Rate the overall features of the WDSSII as compared to AWIPS?

- What did you think were WDSSII strengths? **Comments:** _____

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- What did you think were WDSSII weaknesses? **Comments:** _____

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- How would you improve WDSSII? What should be added, deleted, modified? **Comments:** _____

- Where do you feel we need to make the greatest improvement in the WDSSII? **Comments:** _____

- What are your overall impressions of the WDSSII? **Comments:** _____

- Is the path NSSL is taking to develop a WDSSII a step in the right direction? **YES NO (Circle one)**

Add any Additional Comments Here: _____